197TH HIGH SCHOOL EXAMINATION

PLANE GEOMETRY

Tuesday, January 26, 1909—9.15 a. m. to 12.15 p. m., only

Answer eight questions, selecting two from each group.

Group I 1 Prove that if two sides of a triangle are unequal, the angles opposite are unequal, and the greater angle is opposite the greater side.

2 Prove that the tangents to a circle drawn from an exterior point are equal and make equal angles with the line joining the point to the center.

3 Prove that if a straight line divides two sides of a triangle proportionally, it is parallel to the third side.

Group II 4 Prove that the areas of two similar triangles are to each other as the squares of any two homologous sides.

5 Show how to inscribe a square in a given circle and give proof.

6 Prove that in any triangle the product of two sides is equal to the product of the diameter of the circumscribed circle by the altitude upon the third side.

Group III 7 The three angles of a triangle are 48°, 82° and 50°; find the three angles formed by the bisectors of the angles of the triangle. Verify by using the theorem involving the sum of the angles about a point in a plane.

8 A chord 1 foot long is 4 inches from the center of a circle; how far from the center of the circle is a chord 9 inches long?

9 A circle has an area of 80 square feet; find the length of an arc of 80°.

Group IV 10 Prove that if the median of a triangle is equal to half the side to which it is drawn, the triangle is a right triangle.

11 Prove that if AB is a diameter of a circle and BC a tangent and AC meets the circumference at D, the diameter is a mean proportional between AC and AD.

12 Given three lines a, b and c; construct a line x so that $a:b::c:x$.